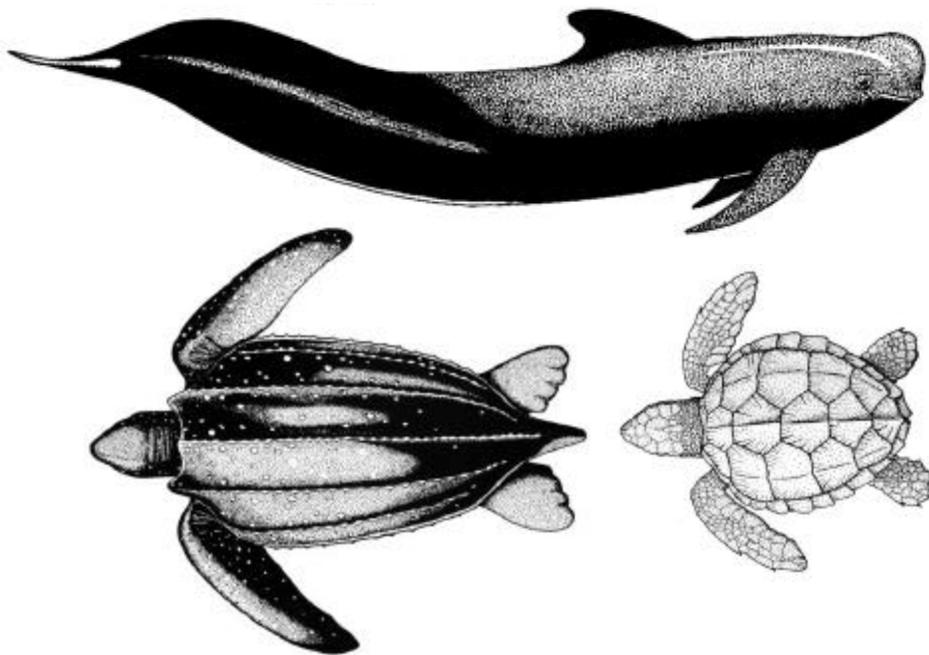




**NOAA TECHNICAL MEMORANDUM NMFS-SEFSC-531**

**Estimated Bycatch of Marine Mammals and Turtles in the U.S. Atlantic Pelagic Longline Fleet During 2004.**

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## Abstract

The U.S. Atlantic pelagic longline fleet operates throughout the Gulf of Mexico, along the entire U.S. Atlantic coast over the continental shelf and slope, and in distant water areas including the central North Atlantic and the Canadian Grand Banks. The Atlantic longline fleet is defined as a Category I fishery under the Marine Mammal Protection Act, and it is also the subject of management concerns under the Endangered Species Act due to interactions with leatherback and loggerhead turtles. Total bycatch of marine mammals and turtles in the longline fishery was estimated for 2004 using data from the pelagic longline fishery observer program and a mandatory fishery logbook reporting program. I applied a delta-lognormal approach to estimate region specific and total annual interactions with protected species for the fishery. During 2004, there were an estimated 1,359 (999 – 1,849 95%CI) interactions with leatherback turtles (*Dermochelys coriacea*) and 734 (466 – 1,158 95%CI) interactions with loggerhead turtles (*Caretta caretta*). The primary marine mammal species interacting with this fishery were pilot whales (*Globicephala sp.*) with an estimated 108 (50 – 232 95% CI) interactions and Risso's dolphin (*Grampus griseus*) with 49 (19 – 127 95% CI) interactions. Potential sources of bias and uncertainty in these bycatch estimates are discussed.

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## Introduction

Pelagic longline fisheries operate throughout the world's oceans targeting large pelagic fish predators including swordfish, tunas, and sharks. The U.S. Atlantic pelagic longline fleet operates throughout the Gulf of Mexico, along the entire U.S. Atlantic coast over the continental shelf and slope, and in distant water areas including the central North Atlantic and the Canadian Grand Banks (Figure 1). The Atlantic longline fleet is defined as a Category I fishery under the Marine Mammal Protection Act (50 CFR Part 229, Federal Register Vol. 69, No. 135, 15 July 2003) due to frequently documented interactions with marine mammals.

The fishery is also the subject of management concerns under the Endangered Species Act (ESA) due to frequent interactions with marine turtles including leatherback (*Dermochelys coriacea*) and loggerhead turtles (*Caretta caretta*). In June 2004, a biological opinion was issued by the NOAA Fisheries Service, Southeast Regional Office finding that the U.S. Pelagic Longline Fleet posed a jeopardy to leatherback turtles in the Atlantic ocean as defined under the ESA. To allow continued operation of the fishery, the biological opinion mandated increases in the frequency in reporting of bycatch, education and outreach programs, and instituted large-scale changes in fishing gear. Most notably, the fishery was required to exclusively use "circle" hooks (size 16/0 or greater) after August, 2004. This mandate was based upon expected reductions in bycatch rate due to hook shape and size based upon experimental studies conducted in the Northeast Distant Water (NED) fishing area (Watson *et al.*, 2005).

In addition to the recently mandated gear changes, several time-area closures were introduced into the fishery in 2000 and 2001 due to concerns over both finfish and protected species bycatch (NMFS 2003, 50 CFR Part 635). These include year-round closures near the Desoto canyon in the Gulf of Mexico after November 1, 2000 (Figure 1, Label A), and in waters off the Atlantic coast of Florida after March 1, 2001 (Figure 1, Label B). Seasonal closures are in effect in the Charleston Bump region between February 1 and April 30 (Figure 1, Label C), and a bluefin tuna area off of the New Jersey coast between June 1- to June 30 (Figure 1, Label D). The NED area had been closed to non-experimental longline fishing since 2001; however, it was reopened to fishing with restrictions on gear types in June, 2004.

The pelagic longline fishery has had a fishery observer program (Pelagic Observer Program, POP) in place since 1992 to document finfish bycatch, characterize fishery behavior, and quantify the interactions with protected species (Beerkircher *et al.*, 2002). In addition, a mandatory fishery logbook system (FLS) has been in place since 1992 requiring boat captains to report fishing effort, gear characteristics, and commercial catch. These data have been used to generate annual estimates of marine mammal and turtle bycatch (Johnson *et al.*, 1999; Yeung, 1999a; Yeung 1999b; Yeung, 2001, Garrison 2003, Garrison and Richards, 2004).

In this report, marine mammal and marine turtle bycatch estimates are calculated for pelagic longline fishery effort during 2004. Bycatch rates (catch per 1000 hooks) are quantified based upon observer data by year, fishing area, and quarter. The estimated

bycatch rate is then multiplied by the total fishing effort (number of hooks) reported to the FLS program to obtain estimates of total interactions for each species of marine mammal and turtle.

## **Methodology**

### Geographic Stratification

Fishery observer effort is allocated among 11 large geographic areas and calendar quarter based upon the historical fishing range of the fleet (Figure 1). The target annual coverage during the last several years has been 8% of the total reported sets, and observer effort is allocated randomly based upon reported fishing effort (Beerkircher *et al.*, 2002). The bycatch estimates developed for each species are stratified by year, geographic area, and quarter to reflect the design of the observer program.

Bycatch rates for year-quarter-area strata with reported longline fishery sets that had no corresponding observer coverage were replaced with the mean bycatch rate observed in the quarter-area stratum between 1999-2003. For some cells, there has been no historical observer coverage within the previous 5 years. In these cases, no bycatch estimate was made, and these strata are identified as potential sources of negative bias in the regional and annual estimates for 2004. This approach avoided the potential biases associated with pooling across geographic strata while allowing bycatch estimates for the majority of unobserved strata.

## Delta Estimator

Sets in which a portion of the longline broke away, and therefore had multiple recorded haul times, were combined into single sets. This is consistent with the approach of the most recent mortality estimate (Garrison, 2003; Garrison and Richards, 2004). The mean and variance of catch rates for marine mammals and turtles in observed longline sets was calculated using a delta estimator (Pennington 1993). The delta estimator is more appropriate than the simple mean because catch rates are generally log-normally distributed and bycatch events (i.e., positive sets) are rare. The unit of effort in this analysis is the number of hooks, and this is consistent with methods used to estimate total catch and bycatch of finfish and previous analyses of protected resource interactions (Johnson *et al.* 1999). The delta mean bycatch rate for each analytical stratum,  $t$ , is calculated as:

$$(1) \quad C_t = \frac{m_t}{n_t} e^{L_t} G(s_L^2/2),$$

where:

$m_t$  is the number of sets with observed bycatch,

$n_t$  is the total number of observed sets,

$L_t$  is the mean of the log-transformed number of animals taken per 1000 hooks when bycatch occurred.

$s_L^2$  is the observed sample variance of the log transformed bycatch rate, and

$G$  is the cumulative probability function from the Poisson distribution given as:

$$(2) \quad G(s_L^2/2) = 1 + \frac{m_t - 1}{m_t} (s_L^2/2) + \sum_{j=2}^{\infty} \frac{(m_t - 1)^{2j-1}}{m_t^j (m_t + 1)(m_t + 3) \dots (m_t + 2j - 3)} \times \frac{(s_L^2/2)^j}{j!}.$$

The series was computed numerically over  $j$  terms until meeting a convergence criterion of a change in the function value of  $< 0.0001$  with additional terms ( $j$ ). Convergence was generally achieved with  $< 10$  terms. The variance of the delta estimator is:

$$(3) \text{ var}(C_t) = \frac{m_t}{n_t} \left( e^{2L_t} \left[ \frac{m_t}{n_t} G^2(s_L^2/2) - \left( \frac{m_t-1}{n_t-1} \right) G\left( \frac{m-2}{m-1} s_L^2 \right) \right] \right).$$

When  $m_t$  is equal to 1, the mean bycatch rate reduces to the simple mean rate where

$$(4) C_t = \frac{\exp(L_t)}{n_t},$$

and

$$(5) \text{ var}(C_t) = \left( \frac{\exp(L_t)}{n_t} \right)^2.$$

The  $C_t$  calculated above gives the mean number of animals caught per 1000 hooks in the observed trips. To estimate total interactions,  $N$ , these rates are multiplied by the total number of hooks reported to the FLS database for each analytical stratum. The stratified estimates and associated variances were summed to provide annual estimates for each species. Approximate 95% confidence intervals were calculated assuming lognormal distribution of total mortality as  $N/C$  and  $N \cdot C$  for the lower and upper confidence bounds respectively where:

$$(6) C = \exp [ z_a \sqrt{\text{var}(\ln N)} ],$$

and

$$(7) \text{ var}(\ln N) = \ln [ 1 + \text{var}(N)/N^2 ],$$

where  $z_a$  is 1.906, the  $z$  score for  $a = 0.05$ .

### Sea Turtle Life History Form

Detailed information on the characteristics of longline interactions with sea turtles was recorded by the fisheries observers during 2004. These data include detailed descriptions of the type of interaction, the extent of entanglement, the location of any hook attached to the animal or swallowed, and other data (Appendix A). Information on entanglement, hooked animals, and the location of hooks are shown in Table B2.

### Marine Mammal Serious Injury Determination

The Marine Mammal Protection Act (MMPA) requires that mortality and serious injury of marine mammals incidental to commercial fishing operations be reduced below potential biological removal (PBR). “Serious injury” has been defined as an injury likely to result in mortality (NOAA Fisheries 50 CFR 229.2, Angliss and DeMaster, 1998). A workshop of NOAA Fisheries and external experts was convened in 1997 to evaluate the types of injuries occurring in commercial fisheries and guidelines for determining if a given marine mammal observed interacting with commercial fishing gear was seriously injured. For small cetaceans, including pilot whales and other delphinids, it was concluded that animals that ingested hooks, were released with significant amounts of trailing fishing gear, were swimming abnormally, or suffered some obvious severe external trauma should be considered seriously injured (Angliss and Demaster, 1998). Serious injury determinations are made on a case by case basis after reviewing the observations and comments of fishery observers. For this report, observer comments for all takes of marine mammals from 2004 (Table B4) were reviewed and serious injury

determinations were verified based upon observer comments and photographs consistent with current NOAA fisheries guidelines.

## **Results and Discussion**

### Reported Fishing Effort and Observer Coverage

The total reported pelagic longline fishing effort included 7.22 million hooks during 2004 (Table 1a). The reported fishery effort included 9,680 sets during 2004, and of these 702 were observed by the POP program for an overall coverage of 7.3% (Table 1, Table 2, Table 3, Figure 2). Observer coverage for specific area-quarter strata typically ranged between 3-9% of reported sets (Table 3).

During the first and second quarters, a total of 60 experimental sets were made in the Gulf of Mexico employing circle hooks to investigate potential effects on turtle bycatch. These experimental sets had 100% observer coverage, and were thus separated from the normal commercial fishery. Data from these sets are labeled “GME” in the summary tables.

The area-quarter strata with reported fishing effort but with no observer coverage are identified in Table 3. Observer coverage was available for the majority of these within the previous five years with the exception of SAR-Quarter 4 and TUS-Quarter 2. There has been very little historical observer coverage of the SAR, TUN, and TUS areas, and therefore no bycatch estimate is possible for these geographic areas.

### Observed Protected Species Interactions

There were a total of 89 observed interactions with leatherback turtles and 53 with loggerheads (Table 4, Figure 3, Table B1). No turtles were observed dead on capture. The greatest number of leatherback takes occurred in the GOM region during the 2<sup>nd</sup> and 3<sup>rd</sup> quarters followed by the MAB and NED regions (Table 4a, Figure 3, Table B1). Loggerhead takes were more broadly distributed with the highest observed takes in the SAR, NED, FEC, and MAB areas (Table 4b, Figure 3, Table B1).

The vast majority of the turtles were characterized as being released alive and injured (i.e., most had been hooked) based upon recorded information on the sea turtle life history form (Table 5a, Table 5b, Table B2). Leatherback turtles were most typically hooked externally, while loggerhead turtles primarily swallowed the hook or were hooked in the mouth (Table 5b). All gear was removed before release from 53 of the 142 turtles captured. Removing gear was most difficult from loggerheads that had swallowed the hook (Table 5c).

There were a total of 12 interactions observed with marine mammals during 2004 (Table 6, Table B3, Figure 4). The majority of these interactions were observed in the MAB region. The majority of interactions with marine mammals were with pilot whales (*Globicephala sp.*). Eight of the observed marine mammal interactions were categorized as serious injuries, with most of these being pilot whales (Table 7). All serious injuries involved being hooked in the mouth and/or released with a significant amount of entangling gear (Table 7, Table B4).

## Total Estimated Bycatch and Mortality

Stratum estimates of mortality and total interactions for marine turtles are shown in Table 8. Leatherback interactions during 2004 were dominated by the Gulf of Mexico region with high takes during the 1<sup>st</sup> and 2<sup>nd</sup> quarters (Table 8b, Figure 3). Leatherback takes were also high in the MAB (Quarter 4), SAB (Quarter 1) and NED (Quarter 3). For loggerhead turtles, the highest takes occurred during the 1<sup>st</sup> Quarter in the SAB area, and in the FEC, CAR, and NEC areas (Table 8b, Figure 3).

The quarter-area strata estimates for marine mammal mortality, serious injury, and live releases are presented in Table 9. The majority of marine mammal serious injury occurred in the mid-Atlantic Bight region during the fourth quarter (Table 9a, Figure 4).

The average bycatch rates and estimated catches in strata that were not observed during 2004 across the previous 5 years (1999-2003) are summarized in Table 10. The highest estimated take from these unobserved areas was 65.7 loggerheads in the NEC, Quarter 2 (Table 10).

There were estimated to be a total of 1,358.8 (998.8 – 1,848.6 95% CI) interactions with leatherback turtles during 2004 (Table 11a). During 2004, the interactions with leatherback turtles were very high (780 animals) in the Gulf of Mexico. There were an additional 3 observed leatherback interactions in experimental fishing. For loggerhead turtles, there was an estimated total of 734 interactions (466 – 1,158 95% CI) during 2004. The majority of these interactions occurred in the SAB, NEC, FEC, and MAB (Table 11b). The current estimates of turtle bycatch continue trends that have been observed during the last 5 years for both species. The leatherback take estimate for 2004 has reached a historical high, and the nearly linear increase in the estimates since

1998 has continued through 2004 (Figure 5a). It is important to note, however, that the majority of leatherback takes during 2004 occurred before the new regulations were in place. The loggerhead turtle takes remain low relative to the historical high observed in 1995; however, there has been an increasing trend in the last four years (Figure 5b). The total reported fishery effort declined during the period from 1998-2002, though it rebounded during the last two years (Figure 5). For leatherbacks, the generally linear increase in total catch therefore reflects primarily changes in bycatch rate. This may be due to changes in fishery practices that increase interactions with turtles, increases in the population size of leatherback turtles, and/or environmental changes that increase the availability of turtles to the longline fishery.

A total of 74 pilot whales and 28 Risso's dolphin are estimated to have suffered serious injury or mortality in the longline fishery during 2004 (Table 12). The total estimated number of interactions was 108 (50 – 232 95% CI) for pilot whales and 49 (19 – 127 95% CI) for Risso's dolphins (Table 12).

#### Sources of Bias and Uncertainty

The fishery logbook data is a mandatory reporting program, and thus it is expected that reporting rates are generally high. Due to the intense management focus on the longline fishery, there has been close monitoring of reporting rates, and observed trips can be directly linked to reported effort. In general, the gear characteristics and amount of observed effort is consistent with the reported effort. However, underreporting is possible in this fishery and would result in a direct negative bias in bycatch estimates.

Observer coverage in the pelagic longline fishery is generally high, particularly in comparison to that of other commercial fisheries. The sampling level, on average, is sufficient to provide reasonable quantification of interactions with protected species. The observed coefficients of variation for annual estimates of both loggerhead and leatherback turtles are <30%, and this is consistent with guidelines for accuracy set by NOAA Fisheries. However, in some strata there is little or no coverage during particular times of year. During 2004, the most notable gaps in coverage occurred in the NEC region where there were significant amounts of reported fishing effort. The estimated bycatch based upon previous years' observer coverage contributed significant numbers of takes for these strata. Applying observer data from previous years is inherently uncertain since bycatch rates can vary significantly in time and space. Estimates for those strata supplemented by previous observer coverage should therefore be treated with caution.

For some strata, there has been no recent observer coverage, and thus regional and annual estimates of bycatch are potentially negatively biased. The most glaring omission is the low current and historical coverage of the offshore areas including the SAR, TUN, and TUS regions. These offshore strata traditionally have low levels of observer coverage, and therefore it is currently unknown if there are significant interactions with protected species in these sectors of the longline fishery.

The delta estimator was applied to calculate bycatch rates primarily to maintain consistency with previous estimates for this fishery (Johnson *et al.*, 1999, Yeung, 1999a; Yeung, 1999b; Yeung, 2001; Garrison, 2003; Garrison and Richards, 2004). This approach assumes 1) that catch rates (animals per hook) are lognormally distributed and 2) that the number of hooks is an appropriate unit of effort. The first assumption was

critically examined for turtles in Johnson *et al.* (1999); however, is difficult to verify for marine mammals given the generally low rate of these interactions. The delta estimator is sensitive to the assumption of log-normality, and violations of this assumption may result in biased (positive or negative) estimates of catch rate and associated variances. The second assumption has not been examined critically in previous analyses. The current approach assumes that total bycatch is linearly related to the total number of hooks fished. If this assumption is not correct, for example if there are saturation effects resulting in a non-linear relationship between the number of hooks and total catch, then there is potentially a direct bias in the estimate of total bycatch. This assumption is currently being evaluated along with other potential units of effort and statistical approaches to avoid bias and improve precision in bycatch estimates for the pelagic longline fleet.

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## List of Tables and Figures

**Table 1.** Total amount of fishing effort reported to the pelagic longline logbook program during 2004 by year, quarter, and fishing area. Fishing effort is reported as A) Number of hooks (thousands) and B) Number of sets. GME indicates experimental sets in the Gulf of Mexico.

**Table 2.** Total amount of fishing effort observed during 2004 by year, quarter, and fishing area. Fishing effort is reported as A) Number of hooks (thousands) and B) Number of sets. GME indicates experimental sets in the Gulf of Mexico. Dashes indicate cells where no fishery effort was reported.

**Table 3.** Percentage of reported fishing effort observed during 2004 by year, quarter, and fishing area by A) Number of hooks and B) Number of sets. Dashes indicate no reported fishing effort. Cells in which >10 longline sets were reported with no observer coverage are indicated in bold.

**Table 4.** Total number of observed interactions with A) Leatherback turtles, B) Loggerhead turtles, and C) All marine turtles in the pelagic longline fishery during 2004 by year, quarter, and fishing area. Dashes indicate areas where there was no observed fishing effort, and an X indicates an area where no effort was reported. Only loggerhead and leatherback turtles were observed captured.

**Table 5.** Summary of (A) release condition, (B) and hook location in hooked animals, (C) animals with all gear removed, by hook location for marine turtles in the pelagic longline fishery during 2004. Hook location information is recorded on the sea turtle life history form (Appendix A) by the observer.

**Table 6.** Total number of observed interactions with marine mammals in the pelagic longline fishery during 2004 by year, quarter, and fishing area. Dashes indicate areas where there was no observed fishing effort, and an X indicates an area where no effort was reported.

**Table 7.** Summary of release condition and serious injury types for marine mammals in the pelagic longline fishery during 2004. Serious injury determinations were based upon written observer comments (Table B3). “Entangled” indicates that the animal was released with > 4 feet of gear remaining attached.

**Table 8.** Estimated interactions with (A) Leatherback and (B) Loggerhead turtles in the pelagic longline fishery during 2004 by fishing area and quarter. All marine turtles were recorded as released alive (either injured or uninjured). GME indicates experimental sets in the Gulf of Mexico with 100% observer coverage. Observed catches for those experimental sets are highlighted.

**Table 9.** Estimated (A) Serious Injury, (B) Live Releases, and (C) Total Interactions with marine mammals in the pelagic longline fishery during 2004 by fishing area and quarter.

**Table 10.** Estimated interactions in the pelagic longline fishery for strata with reported fishing effort but no observer coverage during 2004. Bycatch rates are the average of the stratum rates during the previous five years (1999-2003) where there was observer coverage. Estimates are presented for those strata with previously observed bycatch. In the case of Risso's dolphins, the previously observed catch was a live release. All previously observed turtle catches were likewise released alive (injured or uninjured).

**Table 11.** Total estimated interactions with (A) Leatherback and (B) Loggerhead turtles in the pelagic longline fishery during 2004 by fishing area. These estimates include extrapolated values for areas with no observer coverage during 2004 that had observed interactions during the past five years (Table 10). Observed catches for experimental sets in the Gulf of Mexico are listed separately. All captured marine turtles were listed as released alive (injured or uninjured).

**Table 12.** Total estimated interactions with marine mammals in the pelagic longline fishery during 2004. These estimates include extrapolated values for areas with no observer coverage during 2004 that had observed interactions during the past five years (Table 10).

**Figure 1.** Pelagic longline fishing areas in the north Atlantic ocean indicating 11 defined fishing areas. CAR = Caribbean, GOM = Gulf of Mexico, FEC = Florida East Coast, SAB = South Atlantic Bight, SAR = Sargasso Sea, MAB = Mid-Atlantic Bight, NEC = Northeast Coastal, NED = Northeast Distant, NCA = North Central Atlantic, TUN = Tuna North, TUS = Tuna South. Pelagic longline closed areas are indicated by shaded polygons and letter labels (A-E). The NED area was reopened on June 30, 2004.

**Figure 2.** Observed (grey symbols) and reported (dark symbols) pelagic longline fishing effort during 2004.

**Figure 3.** Observed pelagic longline fishing effort and marine turtle takes during 2004.

**Figure 4.** Observed pelagic longline fishing effort and marine mammal takes during 2004.

**Figure 5.** Historical trends in fishery effort and estimated marine turtle takes in the pelagic longline fishery between 1992-2004.

**Table 1.** Total amount of fishing effort reported to the pelagic longline logbook program during 2004 by year, quarter, and fishing area. Fishing effort is reported as A) Number of hooks (thousands) and B) Number of sets. GME indicates experimental sets in the Gulf of Mexico.

**A. Number of Hooks (thousands)**

Quarter	CAR	FEC	GME	GOM	MAB	NCA	SAB	SAR	TUN	TUS	NEC	NED	Total
1	209.1	136.1	20.4	877.5	65.1	19.6	121.2	95.4	9.0	17.5	0	0	1570.9
2	79.2	60.6	9.8	1317.3	117.6	1.4	409.7	4.7	0	20.0	96.4	0	2116.8
3	0	34.5	0	1004.5	216.0	0	89.9	0	0	0	291.7	369.7	2006.3
4	4.6	21.8	0	850.2	439.9	0	31.6	16.4	0	0	71.6	86.2	1522.3
<b>Total</b>	<b>292.8</b>	<b>253.0</b>	<b>30.2</b>	<b>4049.6</b>	<b>838.5</b>	<b>21.0</b>	<b>652.5</b>	<b>116.5</b>	<b>9.0</b>	<b>37.5</b>	<b>459.8</b>	<b>455.9</b>	<b>7216.2</b>

**B. Number of Sets**

Quarter	CAR	FEC	GME	GOM	MAB	NCA	SAB	SAR	TUN	TUS	NEC	NED	Total
1	244	276	40	1151	102	22	174	110	9	18	0	0	2146
2	99	126	20	1751	188	2	577	6	0	19	110	0	2898
3	0	82	0	1299	332	0	172	0	0	0	359	364	2608
4	6	58	0	1149	563	0	66	16	0	0	78	92	2028
<b>Total</b>	<b>349</b>	<b>542</b>	<b>60</b>	<b>5350</b>	<b>1185</b>	<b>24</b>	<b>989</b>	<b>132</b>	<b>9</b>	<b>37</b>	<b>547</b>	<b>456</b>	<b>9680</b>

**Table 2.** Total amount of fishing effort observed during 2004 by year, quarter, and fishing area. Fishing effort is reported as A) Number of hooks (thousands) and B) Number of Sets. GME indicates experimental sets in the Gulf of Mexico. Dashes indicate cells where no fishery effort was reported.

**A. Number of Hooks (thousands)**

Quarter	CAR	FEC	GME	GOM	MAB	NCA	SAB	SAR	TUN	TUS	NEC	NED	Total
1	20.3	14.3	19.7	41.8	6.8	2.9	0.8	28.8	0	0	-	-	135.5
2	11.7	1.7	10.6	52.4	13.5	0	25.2	0	-	0	0	-	115.1
3	-	5.2	-	67.8	14.6	-	4.8	-	-	-	15.9	61.0	169.3
4	0	1.5	-	51.0	32.8	-	2.7	0	-	-	3.7	23.7	115.4
<b>Total</b>	<b>32.1</b>	<b>22.7</b>	<b>30.3</b>	<b>213.1</b>	<b>67.7</b>	<b>2.9</b>	<b>33.5</b>	<b>28.8</b>	<b>0.0</b>	<b>0.0</b>	<b>19.6</b>	<b>84.6</b>	<b>535.4</b>

**B. Number of Sets**

Quarter	CAR	FEC	GME	GOM	MAB	NCA	SAB	SAR	TUN	TUS	NEC	NED	Total
1	23	30	40	49	13	3	1	32	0	0	-	-	191
2	16	6	20	61	18	0	37	0	-	0	0	-	158
3	-	11	-	86	23	-	14	-	-	-	22	54	210
4	0	6	-	71	36	-	5	0	-	-	3	22	143
<b>Total</b>	<b>39</b>	<b>53</b>	<b>60</b>	<b>267</b>	<b>90</b>	<b>3</b>	<b>57</b>	<b>32</b>	<b>0</b>	<b>0</b>	<b>25</b>	<b>76</b>	<b>702</b>

**Table 3.** Percentage of reported fishing effort observed during 2004 by year, quarter, and fishing area by A) Number of Hooks and B) Number of Sets. Dashes indicate no reported fishing effort. Cells in which >10 longline sets were reported with no observer coverage are indicated in bold.

**A. Number of Hooks**

Quarter	CAR	FEC	GME	GOM	MAB	NCA	SAB	SAR	TUN	TUS	NEC	NED	Total
1	9.72	10.50	96.66	4.77	10.45	14.78	0.66	30.24	0	<b>0</b>	-	-	8.63
2	14.83	2.81	107.90	3.98	11.46	0	6.16	0	-	<b>0</b>	<b>0</b>	-	5.44
3	-	15.07	-	6.75	6.77	-	5.39	-	-	-	5.44	16.49	8.44
4	0	6.99	-	6.00	7.46	-	8.45	<b>0</b>	-	-	5.19	27.46	7.58
<b>Total</b>	<b>10.95</b>	<b>8.98</b>	<b>100.30</b>	<b>5.26</b>	<b>8.08</b>	<b>13.79</b>	<b>5.14</b>	<b>24.76</b>	<b>0.00</b>	<b>0.00</b>	<b>4.26</b>	<b>18.56</b>	<b>7.42</b>

**B. Number of Sets**

Quarter	CAR	FEC	GME	GOM	MAB	NCA	SAB	SAR	TUN	TUS	NEC	NED	Total
1	9.43	10.87	100.00	4.26	12.75	13.64	0.57	29.09	0	<b>0</b>	-	-	8.90
2	16.16	4.76	100.00	3.48	9.57	0	6.41	0	-	<b>0</b>	<b>0</b>	-	5.45
3	-	13.41	-	6.62	6.93	-	8.14	-	-	-	6.13	14.84	8.05
4	0	10.34	-	6.18	6.39	-	7.58	<b>0</b>	-	-	3.85	23.91	7.05
<b>Total</b>	<b>11.17</b>	<b>9.78</b>	<b>100.00</b>	<b>4.99</b>	<b>7.59</b>	<b>12.50</b>	<b>5.76</b>	<b>24.24</b>	<b>0.00</b>	<b>0.00</b>	<b>4.57</b>	<b>16.67</b>	<b>7.25</b>

**Table 4.** Total number of observed interactions with A) Leatherback turtles, B) Loggerhead turtles, and C) All marine turtles in the pelagic longline fishery during 2004 by year, quarter, and fishing area. Dashes indicate areas where there was no observed fishing effort, and an X indicates an area where no effort was reported. Only loggerhead and leatherback turtles were observed captured.

**A. Leatherback Turtles**

Quarter	CAR	FEC	GME	GOM	MAB	NCA	SAB	SAR	TUN	TUS	NEC	NED	Total
1	1	5	2	6	0	0	1	7	-	-	x	x	22
2	1	1	1	24	5	-	1	-	x	-	-	x	33
3	-	0	x	5	3	x	0	x	x	x	0	13	21
4	x	0	x	1	9	x	0	-	x	x	1	2	13
<b>Total</b>	<b>2</b>	<b>6</b>	<b>3</b>	<b>36</b>	<b>17</b>	<b>0</b>	<b>2</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>15</b>	<b>89</b>

**B. Loggerhead Turtles**

Quarter	CAR	FEC	GME	GOM	MAB	NCA	SAB	SAR	TUN	TUS	NEC	NED	Total
1	5	6	0	0	0	0	1	14	-	-	x	x	26
2	1	1	0	0	0	-	2	-	x	-	-	x	4
3	-	0	x	1	1	x	0	x	x	x	4	8	14
4	x	0	x	2	5	x	2	-	x	x	0	0	9
<b>Total</b>	<b>6</b>	<b>7</b>	<b>0</b>	<b>3</b>	<b>6</b>	<b>0</b>	<b>5</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>8</b>	<b>53</b>

**C. All Turtles**

Quarter	CAR	FEC	GME	GOM	MAB	NCA	SAB	SAR	TUN	TUS	NEC	NED	Total
1	6	11	2	6	0	0	2	21	-	-	x	x	48
2	2	2	1	24	5	-	3	-	x	-	-	x	37
3	-	0	x	6	4	x	0	x	x	x	4	21	35
4	x	0	x	3	14	x	2	-	x	x	1	2	22
<b>Total</b>	<b>8</b>	<b>13</b>	<b>3</b>	<b>39</b>	<b>23</b>	<b>0</b>	<b>7</b>	<b>21</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>23</b>	<b>142</b>

**Table 5.** Summary of (A) release condition, (B) and hook location in hooked animals, (C) animals with all gear removed, by hook location for marine turtles in the pelagic longline fishery during 2004. Hook location information is recorded on the sea turtle life history form (Appendix A) by the observer.

**A. Release condition**

<b>Species</b>	<b>Alive, injured</b>	<b>Alive, uninjured</b>	<b>Alive, unknown</b>	<b>Fresh dead</b>	<b>Total</b>
Leatherback	83	6	0	0	89
Loggerhead	53	0	0	0	53
<b>Total</b>	<b>136</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>142</b>

**B. Hook Location**

<b>Species</b>	<b>Not hooked</b>	<b>Unknown if hooked</b>	<b>Hooked, location unknown</b>	<b>Internal</b>			<b>External</b>
				<b>Unknown internal</b>	<b>Swallowed</b>	<b>Beak/Mouth</b>	
Leatherback	7	4	6	1	0	4	67
Loggerhead	0	0	0	1	31	18	3
<b>Total</b>	<b>7</b>	<b>4</b>	<b>6</b>	<b>2</b>	<b>31</b>	<b>22</b>	<b>70</b>

**Table 5 cont.**

**C. Animals with all gear removed, by hook location**

Species	Not hooked	Unknown if hooked	Hooked, location unknown	Internal			External
				Unknown internal	Swallowed	Beak/Mouth	
Leatherback	7	1	6	0	0	0	25
Loggerhead	0	0	0	0	0	12	2
<b>Totals</b>	<b>7</b>	<b>1</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>27</b>

**Table 6.** Total number of observed interactions with marine mammals in the pelagic longline fishery during 2004 by year, quarter, and fishing area. Dashes indicate areas where there was no observed fishing effort, and an X indicates an area where no effort was reported.

<b>Quarter</b>	<b>CAR</b>	<b>FEC</b>	<b>GME</b>	<b>GOM</b>	<b>MAB</b>	<b>NCA</b>	<b>SAB</b>	<b>SAR</b>	<b>TUN</b>	<b>TUS</b>	<b>NEC</b>	<b>NED</b>	<b>Total</b>
1	2	0	0	0	1	0	0	0	-	-	x	x	3
2	0	0	0	0	0	-	0	-	x	-	-	x	0
3	-	0	x	0	1	x	0	x	x	x	1	1	3
4	x	0	x	0	6	x	0	-	x	x	0	0	6
<b>Total</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>12</b>

**Table 7.** Summary of release condition and serious injury types for marine mammals in the pelagic longline fishery during 2004. Serious injury determinations were based upon written observer comments (Table B3). “Entangled” indicates that the animal was released with > 4 feet of gear remaining attached.

Species	Alive	Dead	Serious Injury Type			Serious injury total	Total
			Mouth hooked	Entangled	Mouth Hooked & entangled		
Common Dolphin	1	0	0	0	0	0	1
Pilot Whale	2	0	1	2	3	6	8
Risso’s Dolphin	1	0	0	1	1	2	3
<b>Total</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>8</b>	<b>12</b>

**Table 8.** Estimated interactions with (A) Leatherback and (B) Loggerhead turtles in the pelagic longline fishery during 2004 by fishing area and quarter. All marine turtles were recorded as released alive (either injured or uninjured). GME indicates experimental sets in the Gulf of Mexico with 100% observer coverage. Observed catches for those experimental sets are highlighted.

**A. Leatherback Turtles**

Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	CV	Hooks Reported (x1000)	Estimated Catch
1	CAR	1	23	0.0566	1.0000	209.1	11.8
1	FEC	5	30	0.2521	0.4280	136.1	34.3
<b>1</b>	<b>GME</b>	<b>2</b>	<b>40</b>	-	-	<b>20.4</b>	<b>2</b>
1	GOM	5	49	0.1238	0.4456	877.5	108.7
1	SAB	1	1	1.2438	1.0000	121.2	150.8
1	SAR	6	32	0.1933	0.3893	95.4	18.4
2	CAR	1	16	0.0710	1.0000	79.2	5.6
2	FEC	1	6	0.4975	1.0000	60.6	30.2
<b>2</b>	<b>GME</b>	<b>1</b>	<b>20</b>	-	-	<b>9.8</b>	<b>1</b>
2	GOM	18	61	0.4441	0.2220	1317.3	585.0
2	MAB	4	18	0.3329	0.4834	117.6	39.1
2	SAB	1	37	0.0334	1.0000	409.7	13.7
3	GOM	5	86	0.0724	0.4467	1004.5	72.7
3	MAB	2	23	0.2001	0.7336	216.0	43.2
3	NED	10	54	0.2401	0.3129	369.7	88.7
4	GOM	1	71	0.0159	1.0000	850.2	13.5
4	MAB	7	36	0.2308	0.3648	439.9	101.5
4	NEC	1	3	0.3086	1.0000	71.6	22.1
4	NED	2	22	0.1036	0.6978	86.2	8.9

**Table 8 cont.**

**B. Loggerhead Turtles**

Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	CV	Hooks Reported (x1000)	Estimated Catch
1	CAR	5	23	0.2600	0.4077	209.1	54.4
1	FEC	6	30	0.4341	0.3923	136.1	59.1
1	SAB	1	1	1.2438	1.0000	121.2	150.8
1	SAR	8	32	0.4274	0.3573	95.4	40.8
2	CAR	1	16	0.0682	1.0000	79.2	5.4
2	FEC	1	6	0.6614	1.0000	60.6	40.1
2	SAB	2	37	0.0634	0.6982	409.7	26.0
3	GOM	1	86	0.0128	1.0000	1004.5	12.9
3	MAB	1	23	0.1023	1.0000	216.0	22.1
3	NEC	4	22	0.2888	0.4850	291.7	84.2
3	NED	5	54	0.1401	0.5000	369.7	51.8
4	GOM	1	71	0.0381	1.0000	850.2	32.4
4	MAB	5	36	0.1587	0.4473	439.9	69.8
4	SAB	2	5	0.5608	0.6136	31.6	17.7

**Table 9.** Estimated (A) Serious Injury, (B) Live Releases, and (C) Total Interactions with marine mammals in the pelagic longline fishery during 2004 by fishing area and quarter.

**A. Serious Injury**

Species	Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	cv CPUE	# Hooks Reported (x1000)	Estimated Catch
Pilot Whale	1	CAR	2	23	0.0923	0.6909	209.1	19.3
Pilot Whale	1	MAB	1	13	0.0974	1.0000	65.1	6.3
Pilot Whale	4	MAB	3	36	0.1102	0.5632	439.9	48.5
Risso's Dolphin	4	MAB	2	36	0.0626	0.7229	439.9	27.5

**B. Released Alive**

Species	Quarter	Area	# Positive Sets	# Observed Sets	Mean CPUE	cv CPUE	# Hooks Reported (x1000)	Estimated Catch
Common Dolphin	3	NED	1	54	0.0184	1.0000	369.7	6.8
Pilot Whale	3	MAB	1	23	0.0756	1.0000	216.0	16.3
Pilot Whale	4	MAB	1	36	0.0397	1.0000	439.9	17.5
Risso's Dolphin	3	NEC	1	22	0.0535	1.0000	291.7	15.6

**Table 9 cont.**

**C. Total Interactions**

<b>Species</b>	<b>Quarter</b>	<b>Area</b>	<b># Positive Sets</b>	<b># Observed Sets</b>	<b>Mean CPUE</b>	<b>cv CPUE</b>	<b># Hooks Reported (x1000)</b>	<b>Estimated Catch</b>
Common Dolphin	3	NED	1	54	0.0184	1.0000	369.7	6.8
Pilot Whale	1	CAR	2	23	0.0923	0.6909	209.1	19.3
Pilot Whale	1	MAB	1	13	0.0974	1.0000	65.1	6.3
Pilot Whale	3	MAB	1	23	0.0756	1.0000	216.0	16.3
Pilot Whale	4	MAB	3	36	0.1490	0.6032	439.9	65.5
Risso's Dolphin	3	NEC	1	22	0.0535	1.0000	291.7	15.6
Risso's Dolphin	4	MAB	2	36	0.0626	0.7229	439.9	27.5

**Table 10.** Estimated interactions in the pelagic longline fishery for strata with reported fishing effort but no observer coverage during 2004. Bycatch rates are the average of the stratum rates during the previous five years (1999-2003) where there was observer coverage. Estimates are presented for those strata with previously observed bycatch. In the case of Risso's dolphins, the previously observed catch was a live release. All previously observed turtle catches were likewise released alive (injured or uninjured).

Species	Quarter	Area	# Positive Sets 1999-2003	# Observed Sets 1999-2003	Mean CPUE 1999-2003	cv CPUE 1999-2003	# Hooks Reported (x1000) - 2004	Estimated Catch - 2004
Risso's Dolphin	2	NEC	1	32	0.0651	1.0000	96.4	6.3
Loggerhead	2	NEC	8	32	0.6814	0.3761	96.4	65.7
Leatherback	2	NEC	3	32	0.1089	0.5617	96.4	10.5
Loggerhead	4	CAR	1	10	0.2451	1.0000	4.6	1.1

**Table 11.** Total estimated interactions with (A) Leatherback and (B) Loggerhead turtles in the pelagic longline fishery during 2004 by fishing area. These estimates include extrapolated values for areas with no observer coverage during 2004 that had observed interactions during the past five years (Table 10). Observed catches for experimental sets in the Gulf of Mexico are listed separately. All captured marine turtles were listed as released alive (injured or uninjured).

**A. Leatherback Turtles**

<b>Area</b>	<b>Estimated Catch</b>	<b>CV Catch</b>	<b>95% Confidence Interval</b>
CAR	17.5	0.751	4.9 - 62.4
FEC	64.5	0.520	25.4 - 163.8
GOM	779.9	0.183	551.4 - 1103
MAB	183.9	0.284	108.1 - 312.9
NEC	32.6	0.702	9.8 - 108.9
NED	97.7	0.291	56.7 - 168.3
SAB	164.4	0.921	36.9 - 732.1
SAR	18.4	0.389	9 - 37.7
<b>Total</b>	<b>1,358.8</b>	<b>0.163</b>	<b>998.8 - 1848.6</b>
<b>GME</b>	<b>3</b>	<b>-</b>	<b>-</b>

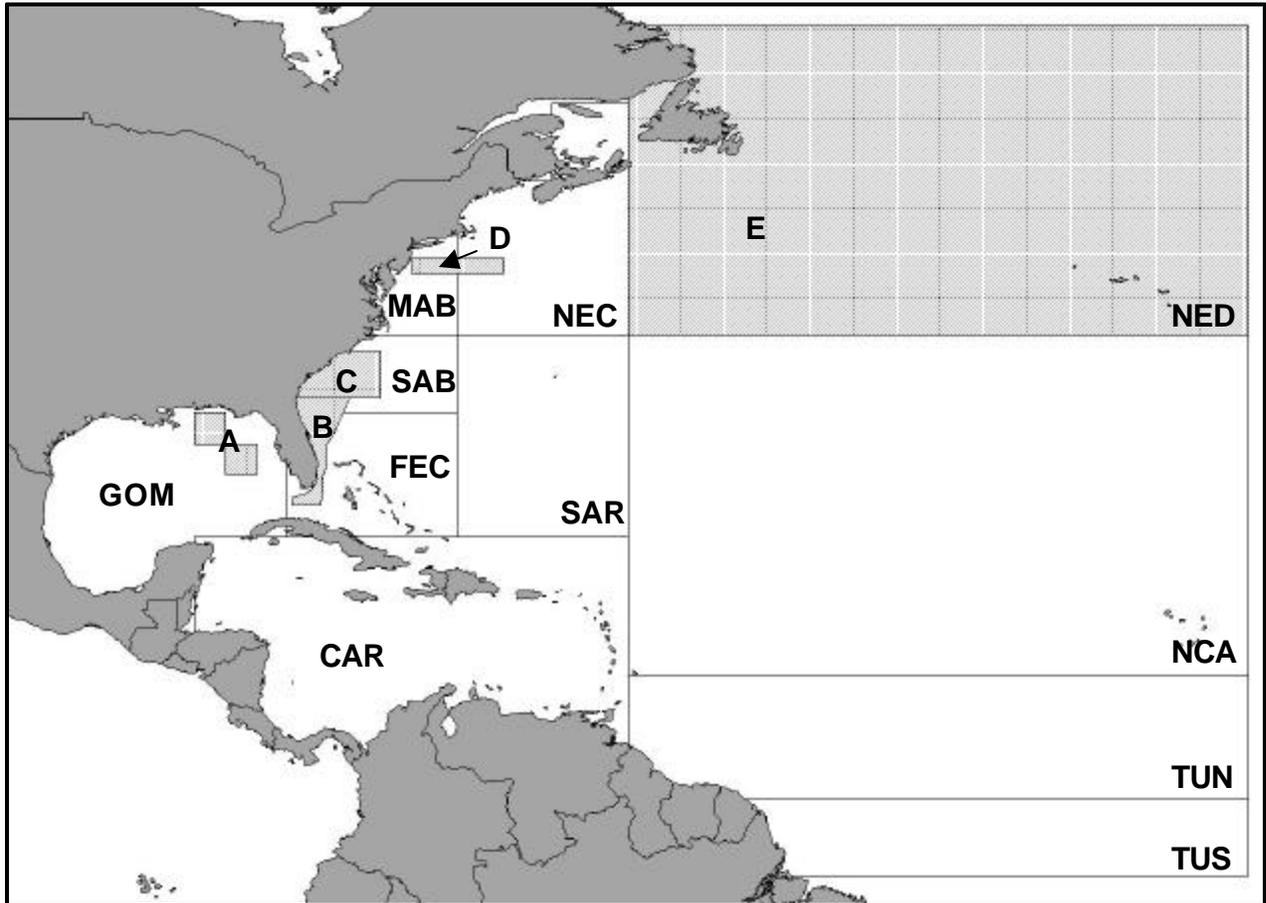
**B. Loggerhead Turtles**

<b>Area</b>	<b>Estimated Catch</b>	<b>CV Catch</b>	<b>95% Confidence Interval</b>
CAR	60.9	0.375	30.5 - 121.6
FEC	99.2	0.467	42.5 - 231.2
GOM	45.2	0.770	12.3 - 166
MAB	91.9	0.416	42.9 - 196.8
NEC	149.9	0.318	82.9 - 271.1
NED	51.8	0.500	21.1 - 127.4
SAB	194.5	0.783	52.1 - 726.4
SAR	40.8	0.357	21.1 - 78.9
<b>Total</b>	<b>734.1</b>	<b>0.242</b>	<b>465.5 - 1157.8</b>

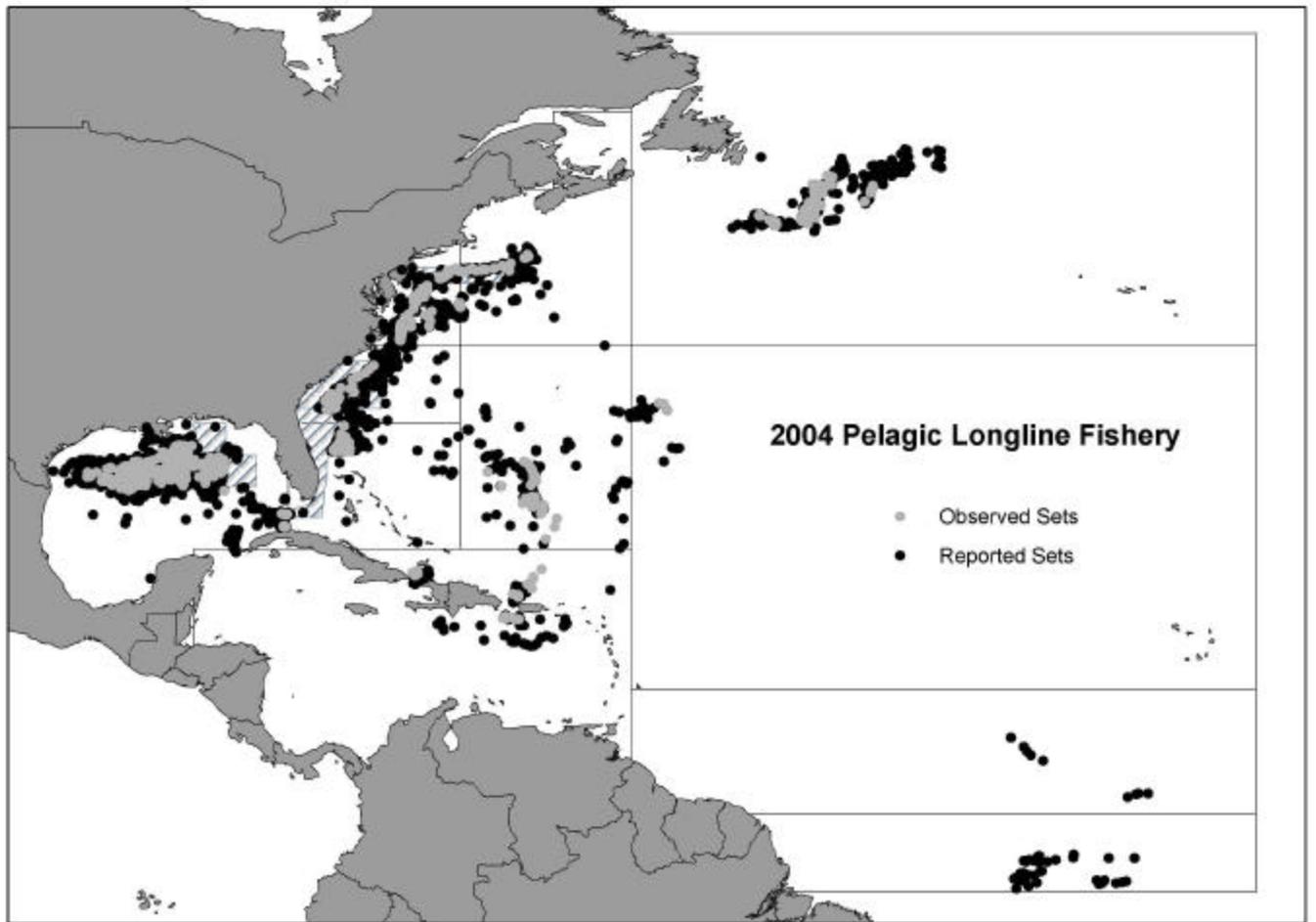
**Table 12.** Total estimated interactions with marine mammals in the pelagic longline fishery during 2004. These estimates include extrapolated values for areas with no observer coverage during 2004 that had observed interactions during the past five years (Table 10).

<b>Species</b>	<b>Estimated Serious Injury</b>	<b>CV SI</b>	<b>Estimated Alive</b>	<b>CV Alive</b>	<b>Estimated Total</b>	<b>CV Total</b>	<b>95% Confidence Interval</b>
Common Dolphin	0.0	-	6.8	1.0000	6.8	1.0000	1.4 - 33.3
Pilot Whale	74.1	0.4188	33.8	0.7075	107.5	0.4209	49.8 - 232.1
Risso's Dolphin	27.5	0.7229	21.9	0.7686	49.4	0.5273	19.2 - 127

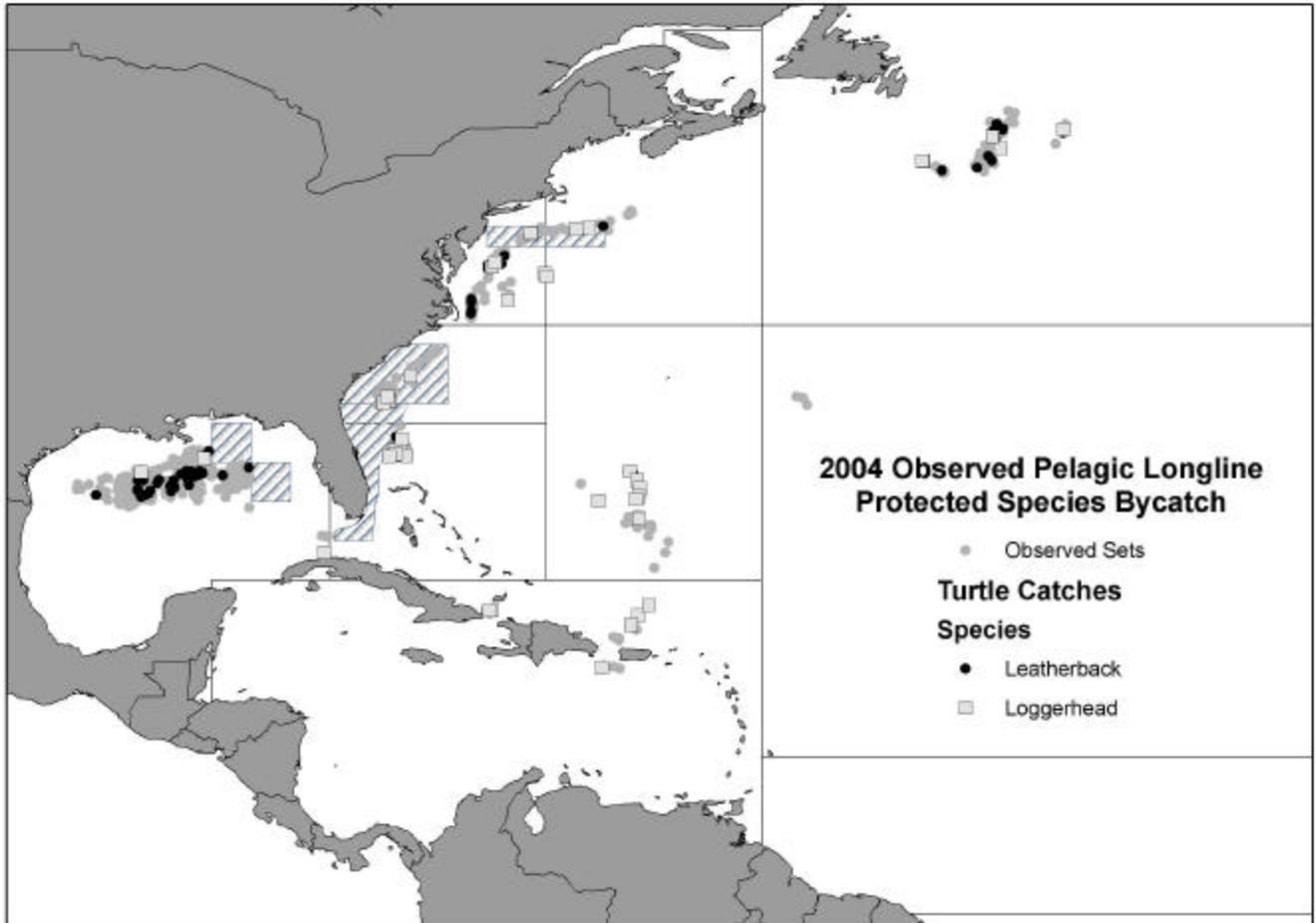
**Figure 1.** Pelagic longline fishing areas in the north Atlantic ocean indicating 11 defined fishing areas. CAR = Caribbean, GOM = Gulf of Mexico, FEC = Florida East Coast, SAB = South Atlantic Bight, SAR = Sargasso Sea, MAB = Mid-Atlantic bight, NEC = Northeast Coastal, NED = Northeast Distant, NCA = North Central Atlantic, TUN = Tuna North, TUS = Tuna South. Pelagic longline closed areas are indicated by shaded polygons and letter labels (A-E). The NED area was reopened on June 30, 2004.



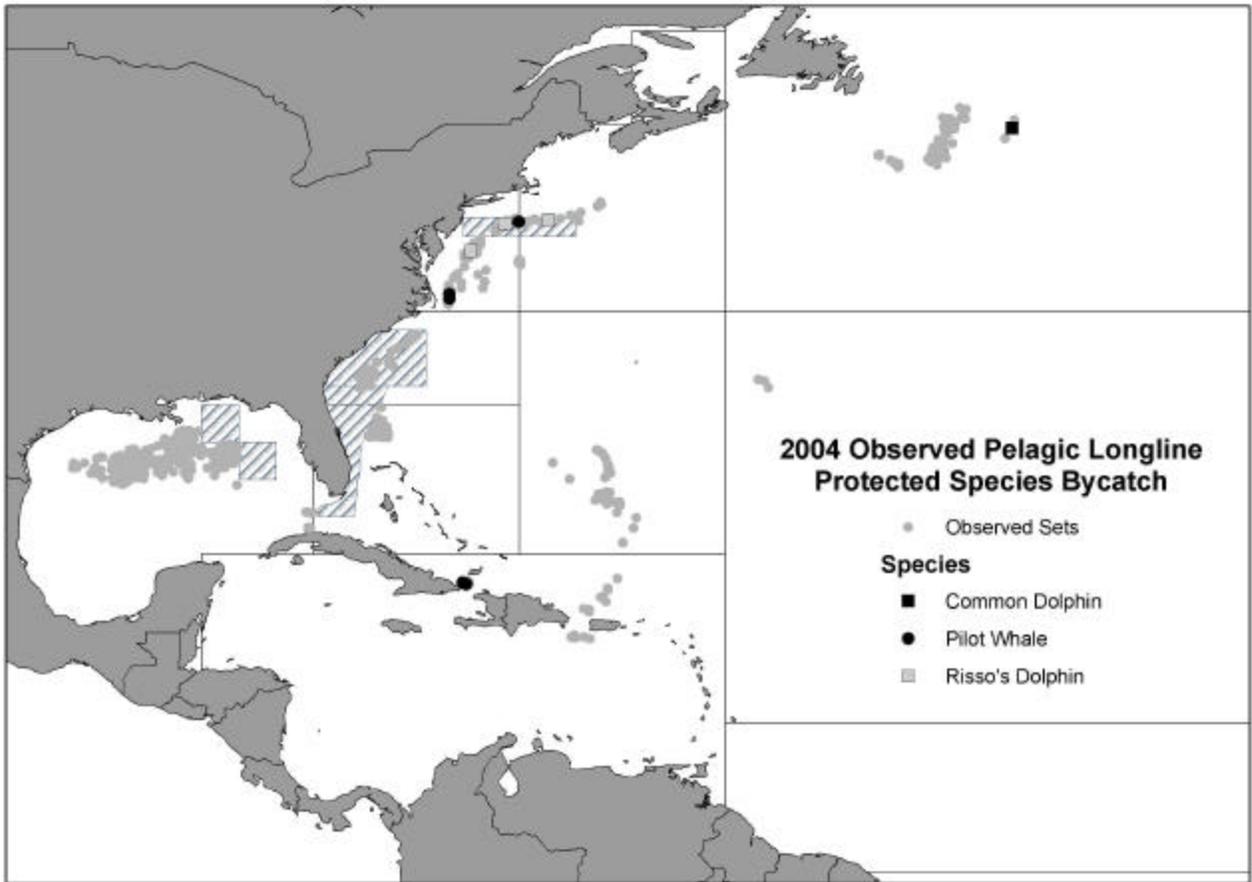
**Figure 2.** Observed (grey symbols) and reported (dark symbols) pelagic longline fishing effort during 2004.



**Figure 3.** Observed pelagic longline fishing effort and marine turtle takes during 2004.

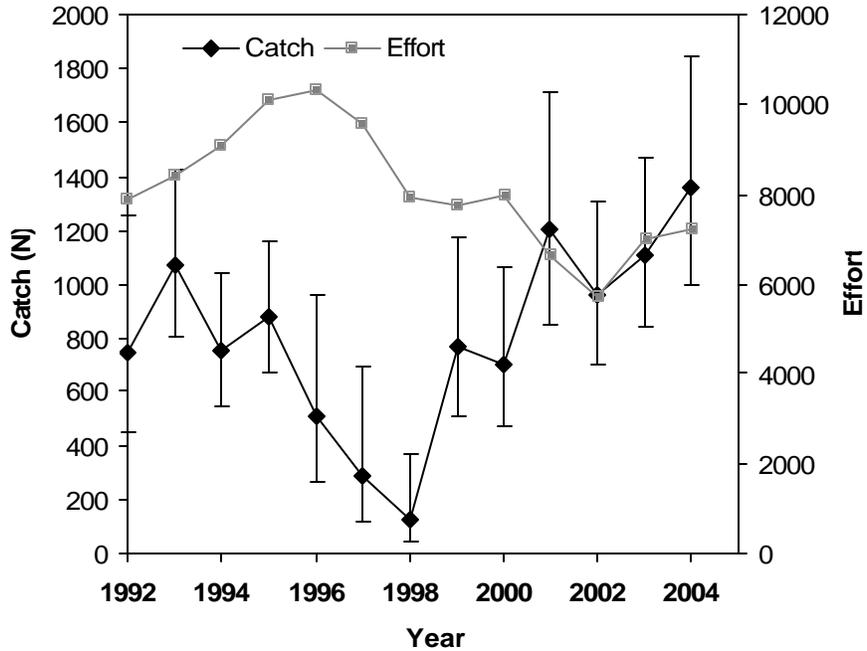


**Figure 4.** Observed pelagic longline fishing effort and marine mammal takes during 2004.

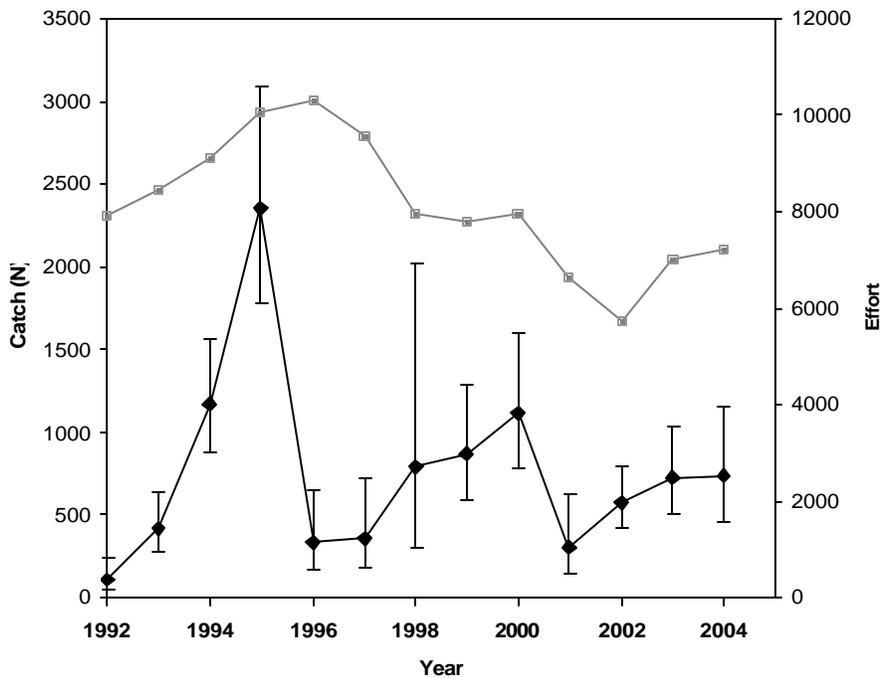


**Figure 5.** Historical trends in fishery effort and estimated marine turtle takes in the pelagic longline fishery between 1992-2004. Errors bars represent 95% confidence intervals.

**A. Leatherback Turtles**



**B. Loggerhead Turtles**







**Appendix B. Detail information on observed interactions with protected species**

**Table B1.** Observed interactions per longline set with marine turtles. All turtles were released alive (injured or uninjured). The number of hooks set along with the number of turtles captured in each set is reported.

<b>Species</b>	<b>Quarter</b>	<b>Area</b>	<b># Hooks</b>	<b># Turtles</b>
Leatherback	1	GME	720	1
Leatherback	1	SAB	804	1
Leatherback	1	SAR	1,188	1
Leatherback	1	SAR	1,188	2
Leatherback	1	SAR	1,188	1
Leatherback	1	SAR	1,188	1
Leatherback	1	SAR	1,188	1
Leatherback	1	CAR	768	1
Leatherback	1	GOM	991	1
Leatherback	1	GOM	973	1
Leatherback	1	GOM	969	1
Leatherback	1	SAR	864	1
Leatherback	1	GME	432	1
Leatherback	1	FEC	756	1
Leatherback	1	FEC	756	1
Leatherback	1	FEC	720	1
Leatherback	1	FEC	432	1
Leatherback	1	FEC	810	1
Leatherback	1	GOM	990	2
Leatherback	1	GOM	990	1
Leatherback	2	SAB	810	1
Leatherback	2	GOM	888	1
Leatherback	2	MAB	435	1
Leatherback	2	GOM	950	1
Leatherback	2	GOM	980	3
Leatherback	2	GOM	980	1
Leatherback	2	GOM	980	1
Leatherback	2	GOM	950	1
Leatherback	2	GOM	950	1
Leatherback	2	GOM	950	2
Leatherback	2	GOM	953	1
Leatherback	2	GOM	962	1
Leatherback	2	GOM	678	1
Leatherback	2	GOM	792	1
Leatherback	2	GOM	792	1
Leatherback	2	GOM	792	1
Leatherback	2	GOM	792	3
Leatherback	2	FEC	335	1
Leatherback	2	CAR	880	1

**Table B1 cont.**

<b>Species</b>	<b>Quarter</b>	<b>Area</b>	<b># Hooks</b>	<b># Turtles</b>
Leatherback	2	GOM	796	1
Leatherback	2	GOM	796	2
Leatherback	2	MAB	918	1
Leatherback	2	MAB	984	1
Leatherback	2	MAB	1,249	2
Leatherback	2	GME	720	1
Leatherback	2	GOM	912	1
Leatherback	3	MAB	660	1
Leatherback	3	MAB	648	2
Leatherback	3	NED	1,004	1
Leatherback	3	NED	1,024	1
Leatherback	3	NED	1,120	1
Leatherback	3	NED	1,152	1
Leatherback	3	NED	768	1
Leatherback	3	NED	1,052	2
Leatherback	3	NED	1,024	3
Leatherback	3	NED	768	1
Leatherback	3	GOM	900	1
Leatherback	3	GOM	955	1
Leatherback	3	GOM	540	1
Leatherback	3	NED	1,200	1
Leatherback	3	NED	900	1
Leatherback	3	GOM	896	1
Leatherback	3	GOM	900	1
Leatherback	4	MAB	955	1
Leatherback	4	MAB	810	1
Leatherback	4	NED	1,024	1
Leatherback	4	NED	768	1
Leatherback	4	NEC	1,080	1
Leatherback	4	MAB	1,236	2
Leatherback	4	MAB	720	1
Leatherback	4	MAB	1,290	2
Leatherback	4	MAB	1,290	1
Leatherback	4	MAB	1,488	1
Leatherback	4	GOM	886	1
Loggerhead	1	CAR	970	1
Loggerhead	1	SAB	804	1
Loggerhead	1	SAR	1,188	1
Loggerhead	1	SAR	1,188	2

**Table B1 cont.**

<b>Species</b>	<b>Quarter</b>	<b>Area</b>	<b># Hooks</b>	<b># Turtles</b>
Loggerhead	1	SAR	1,172	1
Loggerhead	1	SAR	1,188	1
Loggerhead	1	SAR	1,188	3
Loggerhead	1	SAR	1,188	2
Loggerhead	1	FEC	405	1
Loggerhead	1	FEC	360	1
Loggerhead	1	CAR	768	1
Loggerhead	1	CAR	768	1
Loggerhead	1	CAR	768	1
Loggerhead	1	CAR	960	1
Loggerhead	1	SAR	792	2
Loggerhead	1	SAR	756	2
Loggerhead	1	FEC	716	1
Loggerhead	1	FEC	756	1
Loggerhead	1	FEC	432	1
Loggerhead	1	FEC	370	1
Loggerhead	2	FEC	252	1
Loggerhead	2	SAB	900	1
Loggerhead	2	SAB	810	1
Loggerhead	2	CAR	916	1
Loggerhead	3	MAB	425	1
Loggerhead	3	NEC	405	1
Loggerhead	3	NEC	745	1
Loggerhead	3	NED	1,135	1
Loggerhead	3	NED	1,145	1
Loggerhead	3	NEC	720	1
Loggerhead	3	NED	1,024	4
Loggerhead	3	NED	768	1
Loggerhead	3	GOM	908	1
Loggerhead	3	NED	1,100	1
Loggerhead	3	NEC	850	1
Loggerhead	4	SAB	750	1
Loggerhead	4	SAB	680	1
Loggerhead	4	MAB	725	1
Loggerhead	4	MAB	700	1
Loggerhead	4	MAB	700	1
Loggerhead	4	GOM	740	2
Loggerhead	4	MAB	1,236	1
Loggerhead	4	MAB	1,548	1

**Table B2.** Information on gear types and hooking locations based upon observed comments and the sea turtle life history form for each (A) loggerhead and (B) leatherback sea turtle observed taken during 2004. These data are summarized in Table 6.

**A. Loggerhead Turtles**

#	Area	Quarter	Entangled on Capture ?	Entangled on Release ?	Hook Type	Bait Type	Hook Location	Jaw Location	Is the Hook Visible ?	Hook Removed ?	Line Left(ft)	CL -Est(ft)	SCLstd	SCLmin
1	CAR	1	No	No	J hook, 25-30 deg offset, 9/0	unknown/other	swallowed	not applicable	visible, all line removed	No	0	2.3	67.2	64.6
2	CAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	hook not visible	No	0.5	2.2	62.9	61.4
3	CAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	hook not visible	No	0.5	2.5	68.7	67.4
4	CAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	beak(internal)	lower jaw, other	not applicable	Yes	0	2.3	65.4	64.6
5	CAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	hook not visible	No	0.5	2.4	67.1	65.8
6	CAR	2	No	No	J hook, 25-30 deg offset, 9/0	unknown/other	swallowed	not applicable	hook partially visible	No	0	2.4	64.6	62.9
7	FEC	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	unknown	No	3	2	.	.
8	FEC	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	unknown	No	3	1.5	.	.
9	FEC	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	unknown	No	6	1.8	.	.
10	FEC	1	No	No	J hook, 25-30 deg offset, 9/0	squid	unknown internal	unknown	unknown	No	0.5	2.5	.	.
11	FEC	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	unknown	No	1	3	.	.
12	FEC	1	No	No	J hook, 25-30 deg offset, 9/0	squid	mouth	lower jaw, other	not applicable	No	0.5	2	.	.
13	FEC	2	No	No	unknown	unknown/other	mouth	unknown	not applicable	No	3	2	.	.
14	GOM	3	No	No	Circle, 0 deg offset, 16/0	squid	beak(internal)	lower	not applicable	Yes	0	2.2	60.2	62.6
15	GOM	4	No	No	Circle, 0 deg offset, 16/0	squid	swallowed	not applicable	hook not visible	No	5	2.2	.	.
16	GOM	4	No	No	Circle, 0 deg offset, 16/0	squid	mouth	side jaw, other	not applicable	No	1	1.8	.	.
17	MAB	3	No	No	Circle, 0 deg offset, 16/0	squid	mouth	lower jaw, other	not applicable	No	0	2.2	61.5	59

**Table B2a. Loggerheads (cont.)**

#	Area	Quarter	Entangled on Capture ?	Entangled on Release ?	Hook Type	Bait Type	Hook Location	Jaw Location	Is the Hook Visible ?	Hook Removed ?	Line Left(ft)	CL -Est(ft)	SCLstd	SCLmin
18	MAB	4	No	No	Circle, 10 deg offset, 18/0	squid	beak(internal)	lower jaw, other	not applicable	No	0.1	2.5	.	.
19	MAB	4	No	No	Circle, 10 deg offset, 18/0	squid	swallowed	not applicable	hook partially visible	No	0.2	2.3	64.2	.
20	MAB	4	Yes	No	Circle, 10 deg offset, 18/0	unknown/other	front flipper	not applicable	not applicable	Yes	0	2.4	67.9	66.3
21	MAB	4	No	No	Circle, 10 deg offset, 18/0	mackerel	beak(internal)	lower jaw, other	not applicable	Yes	0	2.7	73.7	73.2
22	MAB	4	No	No	Circle, 10 deg offset, 18/0	squid	beak(internal)	lower jaw, other	not applicable	Yes	0	2.4	68.2	66.4
23	NEC	3	No	No	J hook, offset unknown, 9/0	squid	swallowed	not applicable	hook not visible	No	0.2	2.3	.	.
24	NEC	3	No	No	Circle, 0 deg offset, 16/0	squid	mouth	lower jaw, other	not applicable	Yes	0	2.4	67	65.8
25	NEC	3	No	No	Circle, 0 deg offset, 16/0	squid	mouth	lower jaw, other	not applicable	Yes	0	2.2	61.9	60.1
26	NEC	3	Yes	No	unknown	squid	swallowed	not applicable	hook not visible	No	0.2	2.5	72	68.1
27	NED	3	Yes	No	Circle, 10 deg offset, 18/0	unknown/other	shoulder	not applicable	not applicable	Yes	0	2.3	61.8	60.3
28	NED	3	No	No	Circle, 10 deg offset, 18/0	unknown/other	swallowed	not applicable	hook partially visible	No	0.3	2.4	65	63.7
29	NED	3	No	No	Circle, 10 deg offset, 18/0	mackerel	tongue	lower	not applicable	Yes	0	2.2	62.2	60.9
30	NED	3	No	No	Circle, 10 deg offset, 18/0	unknown/other	beak(internal)	lower jaw, other	not applicable	Yes	0	2.2	59.6	57.9
31	NED	3	No	No	Circle, 10 deg offset, 18/0	mackerel	beak(internal)	unknown	not applicable	Yes	0	2	54.1	53.5
32	NED	3	No	No	Circle, 10 deg offset, 18/0	mackerel	rear flipper	not applicable	not applicable	No	0	2.1	58.5	57.2
33	NED	3	No	No	Circle, 10 deg offset, 18/0	mackerel	glottis	lower	not applicable	No	0	2.3	62.1	60.9
34	NED	3	No	No	Circle, 10 deg offset, 18/0	mackerel	mouth	lower jaw, other	not applicable	Yes	0	2.3	63.4	62.1
35	SAB	1	No	No	J hook, 25-30 deg offset, 9/0	unknown/other	swallowed	not applicable	visible, all line removed	No	0.1	2.1	.	.
36	SAB	2	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	hook partially visible	No	0	2.5	70	69.2

**Table B2a. Loggerheads (cont.)**

#	Area	Quarter	Entangled on Capture ?	Entangled on Release ?	Hook Type	Bait Type	Hook Location	Jaw Location	Is the Hook Visible ?	Hook Removed ?	Line Left(ft)	CL -Est(ft)	SCLstd	SCLmin
37	SAB	2	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	hook partially visible	No	0	2.1	61.3	59.4
38	SAB	4	No	No	Circle, 10 deg offset, 18/0	unknown/other	tongue	lower	not applicable	Yes	0	2.7	75.2	73.8
39	SAB	4	No	No	Circle, 10 deg offset, 18/0	unknown/other	mouth	other	not applicable	Yes	0	2.2	62.9	61
40	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	unknown/other	swallowed	not applicable	unknown	No	2	2.8	.	.
41	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	visible, all line removed	No	0	2.2	.	.
42	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	unknown	No	1	2.5	.	.
43	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	unknown	No	1.5	1.8	.	.
44	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	hook not visible	No	0.5	2.2	.	.
45	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	visible, all line removed	No	0.1	2.4	.	.
46	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	visible, all line removed	No	0.2	2.4	.	.
47	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	hook not visible	No	0.5	2.1	.	.
48	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	visible, all line removed	No	0.2	2.3	.	.
49	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	mackerel	swallowed	not applicable	hook not visible	No	0.5	2	.	.
50	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	swallowed	not applicable	hook not visible	No	0.5	2.6	.	.
51	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	unknown/other	swallowed	not applicable	visible, all line removed	No	0.1	2.7	.	.
52	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	unknown/other	swallowed	not applicable	visible, all line removed	No	0.2	2.7	.	.
53	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	unknown/other	swallowed	not applicable	visible, all line removed	No	0.2	2.1	.	.

**Table B2 cont.**  
**B. Leatherbacks**

#	Area	Quarter	Entangled on Capture ?	Entangled on Release ?	Hook Type	Bait Type	Hook Location	Jaw Location	Is the Hook Visible ?	Hook Removed ?	Line Left(ft)	CL -Est(ft)	SCLstd	SCLmin
1	CAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	shoulder	not applicable	not applicable	Yes	0	3.4	.	.
2	CAR	2	No	No	J hook, offset unknown, 9/0	unknown/other	armpit	not applicable	not applicable	Yes	0	5	.	.
3	FEC	1	No	No	J hook, 25-30 deg offset, 9/0	squid	unknown internal	unknown	unknown	No	10	5	.	.
4	FEC	1	Unknown	Unknown	J hook, 25-30 deg offset, 9/0	unknown/other	not known if hooked	unknown	unknown	No	10	5.5	.	.
5	FEC	1	No	No	J hook, 25-30 deg offset, 9/0	squid	armpit	not applicable	not applicable	No	30	5	.	.
6	FEC	1	Unknown	Unknown	J hook, 25-30 deg offset, 9/0	squid	not known if hooked	unknown	unknown	No	12	5	.	.
7	FEC	1	No	No	J hook, 25-30 deg offset, 9/0	squid	neck	not applicable	not applicable	No	15	5	.	.
8	FEC	2	No	No	J hook, offset unknown, 9/0	squid	armpit	not applicable	not applicable	No	3	4.5	.	.
9	GOM	1	No	No	J hook, 0 deg offset, 7/0	squid	unknown external	not applicable	not applicable	No	1	5	.	.
10	GOM	1	No	No	J hook, 0 deg offset, 7/0	squid	neck	not applicable	not applicable	No	1	4	.	.
11	GOM	1	No	No	J hook, 0 deg offset, 7/0	squid	neck	not applicable	not applicable	No	1	4	.	.
12	GOM	1	No	No	Circle, 0 deg offset, 18/0	unknown/other	front flipper	not applicable	not applicable	No	1	4.5	.	.
13	GOM	1	No	No	Circle, 0 deg offset, 16/0	unknown/other	unknown location	unknown	unknown	No	0	4	.	.
14	GOM	1	No	No	J hook, 0 deg offset, 7/0	squid	front flipper	not applicable	not applicable	No	0.6	5	.	.
15	GOM	1	Yes	Yes	J hook, 0 deg offset, 7/0	squid	front flipper/shoulder/arm pit	not applicable	not applicable	No	7	4	.	.
16	GOM	1	Yes	No	J hook, 0 deg offset, 7/0	squid	not known if hooked	unknown	unknown	Yes	0	5	.	.
17	GOM	2	No	No	Circle, 0 deg offset, 18/0	unknown/other	mouth	upper, other	not applicable	No	0.3	5	.	.

**Table B2b cont.**

#	Area	Quarter	Entangled on Capture ?	Entangled on Release ?	Hook Type	Bait Type	Hook Location	Jaw Location	Is the Hook Visible ?	Hook Removed ?	Line Left(ft)	CL -Est(ft)	SCLstd	SCLmin
18	GOM	2	No	No	J hook, 0 deg offset, 7/0	squid	armpit	not applicable	not applicable	No	6	6	.	.
19	GOM	2	No	No	J hook, 0 deg offset, 7/0	squid	shoulder	not applicable	not applicable	No	5	5	.	.
20	GOM	2	Unknown	Unknown	J hook, 0 deg offset, 7/0	squid	unknown location	unknown	unknown	No	.	6	.	.
21	GOM	2	Yes	No	N/A	squid	not hooked	not applicable	not applicable	N/A	0	5	.	.
22	GOM	2	No	No	J hook, 0 deg offset, 7/0	unknown/other	unknown external	not applicable	not applicable	No	2	4	.	.
23	GOM	2	No	No	J hook, 0 deg offset, 7/0	squid	armpit	not applicable	not applicable	No	6	4	.	.
24	GOM	2	No	No	J hook, 0 deg offset, 8/0	squid	unknown location	unknown	unknown	No	3	4	.	.
25	GOM	2	No	No	J hook, 25-30 deg offset, 9/0	squid	armpit	not applicable	not applicable	No	3	4	.	.
26	GOM	2	No	No	J hook, offset unknown, 8/0	squid	unknown location	unknown	unknown	No	168	1	.	.
27	GOM	2	No	No	J hook, offset unknown, 8/0	squid	carapace	not applicable	not applicable	No	5	4	.	.
28	GOM	2	No	No	unknown	unknown/other	armpit	not applicable	not applicable	No	1	4	.	.
29	GOM	2	No	No	unknown	squid	unknown location	unknown	unknown	No	8	4	.	.
30	GOM	2	No	No	unknown	unknown/other	front flipper	not applicable	not applicable	No	1	4	.	.
31	GOM	2	No	No	unknown	unknown/other	mouth	side	hook partially visible	No	1	4	.	.
32	GOM	2	No	No	unknown	unknown/other	armpit	not applicable	not applicable	No	1	4	.	.
33	GOM	2	Yes	No	J hook, offset unknown, 7/0	squid	armpit	not applicable	not applicable	Yes	0	5	.	.
34	GOM	2	Yes	No	J hook, offset unknown, 7/0	squid	rear flipper	not applicable	not applicable	Yes	0	4.5	.	.

**Table B2b cont.**

#	Area	Quarter	Entangled on Capture ?	Entangled on Release ?	Hook Type	Bait Type	Hook Location	Jaw Location	Is the Hook Visible ?	Hook Removed ?	Line Left(ft)	CL -Est(ft)	SCLstd	SCLmin
35	GOM	2	No	No	J hook, offset unknown, 7/0	squid	unknown external	not applicable	not applicable	No	4	5	.	.
36	GOM	2	No	No	J hook, offset unknown, 7/0	squid	front flipper	not applicable	not applicable	No	6	6	.	.
37	GOM	2	No	No	J hook, offset unknown, 7/0	unknown/other	unknown external	not applicable	not applicable	No	6	6.5	.	.
38	GOM	2	No	No	J hook, offset unknown, 7/0	squid	unknown location	unknown	unknown	No	50	6.5	.	.
39	GOM	2	No	No	J hook, offset unknown, 7/0	squid	rear flipper	not applicable	not applicable	No	8	6.5	.	.
40	GOM	2	No	No	unknown	squid	mouth	side	not applicable	No	0	3	.	.
41	GOM	2	No	No	J hook, offset unknown, 7/0	unknown/other	shoulder	not applicable	not applicable	No	8	5	.	.
42	GOM	3	Yes	No	Circle, 0 deg offset, 16/0	squid	not hooked	not applicable	not applicable	N/A	0	3	.	.
43	GOM	3	No	No	J hook, 0 deg offset, 7/0	squid	armpit	not applicable	not applicable	No	0.5	4	.	.
44	GOM	3	No	No	Circle, 0 deg offset, 16/0	unknown/other	armpit	not applicable	not applicable	No	10	6	.	.
45	GOM	3	No	No	J hook, 0 deg offset, 7/0	squid	front flipper/shoulder/arm pit	not applicable	not applicable	No	3	4	.	.
46	GOM	3	No	No	J hook, offset unknown, 7/0	squid	front flipper/shoulder/arm pit	not applicable	not applicable	No	4	5	.	.
47	GOM	4	No	No	Circle, 0 deg offset, 16/0	squid	armpit	not applicable	not applicable	Yes	0	5	.	.
48	MAB	2	Yes	No	J hook, 25-30 deg offset, 9/0	squid	carapace	not applicable	not applicable	No	6	4.5	.	.
49	MAB	2	No	No	J hook, 25-30 deg offset, 9/0	squid	carapace	not applicable	not applicable	No	2	4.1	.	.
50	MAB	2	No	No	J hook, 25-30 deg offset, 9/0	mackerel	armpit	not applicable	not applicable	No	1	6.1	.	.
51	MAB	2	Yes	No	J hook, 25-30 deg offset, 9/0	mackerel	carapace	not applicable	not applicable	No	1	6.1	.	.

**Table B2b cont.**

#	Area	Quarter	Entangled on Capture ?	Entangled on Release ?	Hook Type	Bait Type	Hook Location	Jaw Location	Is the Hook Visible ?	Hook Removed ?	Line Left(ft)	CL -Est(ft)	SCLstd	SCLmin
52	MAB	2	No	No	J hook, offset unknown, 9/0	squid	armpit	not applicable	not applicable	No	0.5	4.5	.	.
53	MAB	3	Yes	No	Circle, 10 deg offset, 18/0	squid	armpit	not applicable	not applicable	No	0	5	.	.
54	MAB	3	Yes	No	Circle, 10 deg offset, 18/0	squid	not hooked	not applicable	not applicable	N/A	0	6	.	.
55	MAB	3	Yes	No	J hook, 10 deg offset, 8/0	unknown/other	shoulder	not applicable	not applicable	No	0	4	.	.
56	MAB	4	No	No	Circle, 10 deg offset, 18/0	unknown/other	shoulder	not applicable	not applicable	Yes	0	4	.	.
57	MAB	4	No	No	Circle, 10 deg offset, 18/0	unknown/other	armpit	not applicable	not applicable	Yes	0	4	.	.
58	MAB	4	No	No	Circle, 10 deg offset, 18/0	squid	shoulder	not applicable	not applicable	Yes	0	4.6	.	.
59	MAB	4	No	No	Circle, 10 deg offset, 18/0	mackerel	armpit	not applicable	not applicable	No	0	4.6	.	.
60	MAB	4	No	No	Circle, 10 deg offset, 18/0	mackerel	carapace	not applicable	not applicable	No	0	4.6	.	.
61	MAB	4	Yes	No	Circle, 10 deg offset, 18/0	squid	not hooked	not applicable	not applicable	N/A	0	4.9	.	.
62	MAB	4	No	No	Circle, 10 deg offset, 18/0	squid	front flipper	not applicable	not applicable	Yes	0	5.2	.	.
63	MAB	4	No	No	Circle, 10 deg offset, 18/0	squid	armpit	not applicable	not applicable	Yes	0	4.6	.	.
64	MAB	4	Yes	No	Circle, 10 deg offset, 18/0	squid	front flipper	not applicable	not applicable	Yes	0	4.9	.	.
65	NEC	4	No	No	Circle, 10 deg offset, 18/0	squid	shoulder	not applicable	not applicable	Yes	0	4.9	.	.
66	NED	3	No	No	Circle, 10 deg offset, 18/0	unknown/other	shoulder	not applicable	not applicable	Yes	0	5	.	.
67	NED	3	No	No	Circle, 10 deg offset, 18/0	squid	armpit	not applicable	not applicable	Yes	0	5	.	.
68	NED	3	Yes	No	Circle, 10 deg offset, 18/0	unknown/other	not hooked	not applicable	not applicable	N/A	0	5	.	.

**Table B2b cont.**

#	Area	Quarter	Entangled on Capture ?	Entangled on Release ?	Hook Type	Bait Type	Hook Location	Jaw Location	Is the Hook Visible ?	Hook Removed ?	Line Left(ft)	CL -Est(ft)	SCLstd	SCLmin
69	NED	3	Yes	No	Circle, 10 deg offset, 18/0	squid	not hooked	not applicable	not applicable	N/A	0	4.9	.	.
70	NED	3	No	No	Circle, 10 deg offset, 18/0	mackerel	front flipper	not applicable	not applicable	Yes	0	5	.	.
71	NED	3	Yes	No	Circle, 10 deg offset, 18/0	unknown/other	armpit	not applicable	not applicable	Yes	0	5.3	.	.
72	NED	3	Yes	No	Circle, 10 deg offset, 18/0	unknown/other	shoulder	not applicable	not applicable	Yes	0	4.8	.	.
73	NED	3	Yes	No	Circle, 10 deg offset, 18/0	unknown/other	shoulder	not applicable	not applicable	Yes	0	4.8	.	.
74	NED	3	Yes	No	Circle, 10 deg offset, 18/0	unknown/other	shoulder	not applicable	not applicable	Yes	0	4.7	.	.
75	NED	3	No	No	Circle, 10 deg offset, 18/0	unknown/other	armpit	not applicable	not applicable	Yes	0	5	.	.
76	NED	3	No	No	Circle, 10 deg offset, 18/0	unknown/other	shoulder	not applicable	not applicable	Yes	0	5	.	.
77	NED	3	No	No	Circle, 10 deg offset, 18/0	unknown/other	armpit	not applicable	not applicable	No	0	4.5	.	.
78	NED	3	Yes	No	Circle, 10 deg offset, 18/0	mackerel	not hooked	not applicable	not applicable	N/A	0	5	.	.
79	NED	4	No	No	Circle, 10 deg offset, 18/0	mackerel	armpit	not applicable	not applicable	Yes	0	5	.	.
80	NED	4	No	No	Circle, 10 deg offset, 18/0	unknown/other	front flipper/shoulder/arm pit	not applicable	not applicable	No	0	5	.	.
81	SAB	1	Yes	Yes	J hook, 25-30 deg offset, 9/0	unknown/other	not known if hooked	unknown	unknown	No	1.5	6	.	.
82	SAB	2	No	No	J hook, offset unknown, 9/0	squid	armpit	not applicable	not applicable	No	0.5	4.5	.	.
83	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	armpit	not applicable	not applicable	No	0.5	5	.	.
84	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	mackerel	armpit	not applicable	not applicable	Yes	0	5.6	.	.
85	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	front flipper/shoulder/arm pit	not applicable	not applicable	Yes	0	5.5	.	.

**Table B2b cont.**

#	Area	Quarter	Entangled on Capture ?	Entangled on Release ?	Hook Type	Bait Type	Hook Location	Jaw Location	Is the Hook Visible ?	Hook Removed ?	Line Left(ft)	CL -Est(ft)	SCLstd	SCLmin
86	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	unknown/other	carapace	not applicable	not applicable	Yes	0	6	.	.
87	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	squid	armpit	not applicable	not applicable	No	3	5.8	.	.
88	SAR	1	No	No	J hook, 25-30 deg offset, 9/0	mackerel	armpit	not applicable	not applicable	No	3	5.8	.	.
89	SAR	1	Unknown	Unknown	J hook, 25-30 deg offset, 9/0	unknown/other	mouth	unknown	unknown	No	1	5	.	.

**Table B3.** Observed interactions per longline set with marine mammals. The number of hooks set along with the number of mammals by release status (alive or seriously injured) in each set is reported.

<b>Species</b>	<b>Quarter</b>	<b>Area</b>	<b># Hooks</b>	<b>Alive</b>	<b>Serious Injury</b>
Common Dolphin	3	NED	1004	1	0
Pilot Whale	1	MAB	790	0	1
Pilot Whale	1	CAR	940	0	1
Pilot Whale	1	CAR	945	0	1
Pilot Whale	3	MAB	575	1	0
Pilot Whale	4	MAB	725	0	1
Pilot Whale	4	MAB	700	1	1
Pilot Whale	4	MAB	864	0	1
Risso's Dolphin	3	NEC	850	1	0
Risso's Dolphin	4	MAB	700	0	1
Risso's Dolphin	4	MAB	1212	0	1

**Table B4:** Observer comments and serious injury codes for marine mammals. Code numbers include 8 – cetacean is hooked internally and 10 – line entangling the animal is likely to further entangle.

Animal #	Species	Release Condition	Injury Code(s)	Observer Comments
1	Pilot Whale	SI	8, 10	Hooked in mouth or gut, line cut, hook and estimated 4' gear left on MPW upon release. Not entangled released alive in good condition. Dove immediately upon release.
2	Pilot Whale	SI	8, 10	Mouth or gut hooked on a single leader. Hook and approx. 4' gear left on animal. Dove immediately upon release.
3	Pilot Whale	SI	8	Mouth or gut hooked on single leader. Tried to Dehook. Line broke at crimp. Hook and 0 ft. of gear left on animal. Dove immediately upon release.
4	Pilot Whale	Alive, No SI	-	MPW entangled in mainline, wrapped around tail and mouth. All gear removed. Animal rested at surface after release, larger animal in vicinity, tired but breathing regularly.
5	Risso's Dolphin	Alive, No SI	-	Mainline wrapped around tail and completely removed. Swam away strong.
6	Common Dolphin	Alive, No SI	-	Hooked in top of mouth, hook removed easily with long pole dehooker. Almost entire side of body covered with white or pale yellow up through the head - good sized beak. Caught on mackerel bait. Swam away fine.
7	Pilot Whale	SI	8,10	Appeared to be hooked in mouth area. Don't know if tangled because only got a quick look. About 20 ft of mono left on after line was cut. Dove out of sight immediately.
8	Pilot Whale	Alive, No SI	-	Wrapped a few times around tail. All gear removed. Swam away immediately.
9	Pilot Whale	SI	10	Wrapped a few times around tail with mainline. About 6ft of mono and a couple of wraps remained after line cut. Swam away immediately
10	Risso's Dolphin	SI	8,10	Hooked in mouth. Line cut with 25ft left attached. Mother or other larger animal hanging with it. Swam away immediately.
11	Pilot Whale	SI	10	Wrapped mainline around pec. fin. Line cut, but 6' of line trailing whale. 2 pieces 6ft long on each pec. fin. Swam away strong.

Animal #	Species	Release Condition	Injury Code(s)	Observer Comments
12	Risso's Dolphin	SI	10	Vessel worked patiently to attempt to bring MRD alongside despite dangerous tension on the mono. Hooks in dorsal fin. Leader broke near leaded swivel. Animal never close enough for photo. Appx. 6' of mono line and hook left on animal. Very active uncooperative animal. Appeared to be in excellent condition, swam away strongly after line broke.